



Modelling the evolution of natural cliffs subject to weathering: I. limit analysis approach

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The evolution of natural slopes subjected to weathering has been modelled by assuming Mohr-Coulomb behaviour, and by using both an analytical and a numerical method. The main novelty introduced in this paper concerns the modelling of soil removal processes affecting the slopes. Slope instability and material movement follow the decrease of material strength in space and time. The only assumption required concerns the weathering distribution within the slope. Then slope evolution is a result of the mechanical modelling. Obtained results have been compared with experimental data and other well established geomorphologic models taken by the literature [Fisher-Lehmann and Bakker-Le Heux].

The analytical model is based on the limit analysis upper bound method. By means of this method, the evolution of cliffs subject to strong weathering conditions (weathering limited conditions) was predicted. The discrete succession of failures taking place was modelled taking into account the different geometry assumed by slopes as a consequent of previous mass movements. A case study from the literature is presented showing a nice match between experimental observations and analytical predictions.